HUMAN BIOMONITORING OF RESIDENTS LIVING IN THE VICINITY OF A MODERN SOLID WASTE INCINERATOR (SWI): A PILOT STUDY IN NORTHERN ITALY

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Background and Aims: As part of IPPC related to the solid waste incinerator in Modena (Emilia-Romagna region, Italy), a human biomonitoring cross-sectional pilot study was carried out to investigate possible biomarkers of exposure related to incinerator emissions.
Methods: Between May and June 2010, 65 subjects living and working within 4 km from the incinerator for at least 3 years (exposed) and 103 referents living and working outside this area, within a 15 km distance from the incinerator for at least 3 years (not exposed) were recruited. Blood and urinary metals (Cd, Cu, Hg, Mn, Ni, Zn) and urinary polycyclic aromatic hydrocarbons (PAHs) were analysed. Information about lifestyle, anthropometric characteristics, residential history, and health status were collected by a self-administered questionnaire. A multivariate regression analysis was performed to investigate the different concentration of biomarkers in the two groups and the possible relationship between biomarkers and the distance of residence from the plant.
Results: Metals showed no difference between groups; their levels were within the Italian population reference values, with the exception of blood Zn and urinary Ni (possible sampling contamination). Metals showed association with age, gender, BMI, smoking habit, education, traffic, and diet, as expected.
As regard PAHs, 5 of them presented more than 50% of their values below the limit of quantification. The mean level of the remaining PAHs was: naphthalene 53.05±25.86ng/L, phenanthrene 9.27±5.52ng/L, fluorene 2.84±4.31ng/L, pyrene 1.56±0.71ng/L, and anthracene 0.73±0.62ng/L. The comparison between the two groups showed higher levels in the exposed subjects only for phenanthrene and anthracene ($p<0.01$).
Results of the multiple regression analysis showed that urinary phenanthrene, anthracene and Mn were inversely correlated to the distance of residence from the plant.
Conclusions: This study suggests that specific urinary PAHs and Mn may provide information about the exposure arising from SWI. Further analyses will investigate incinerator fallout maps.